Trend Study 24-7-03

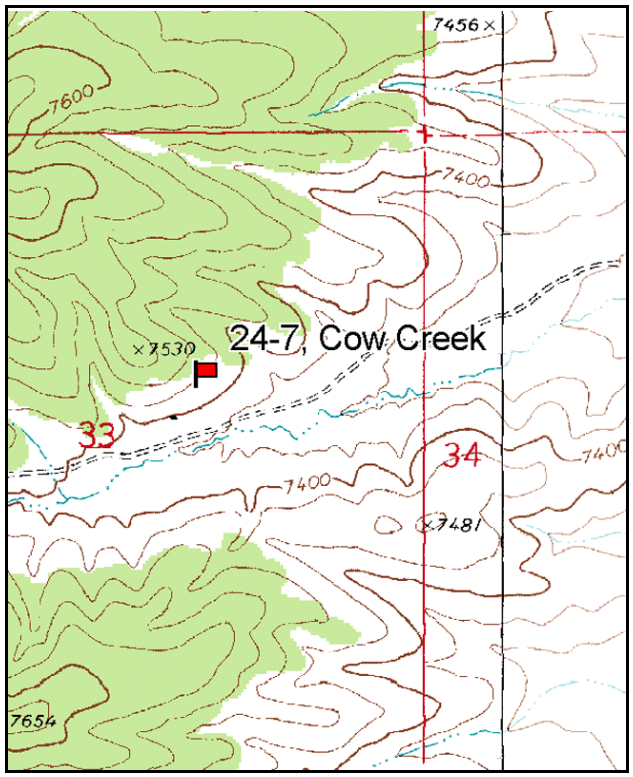
Study site name: Cow Creek . Vegetation type: Chained, Shrubland .

Compass bearing: frequency baseline 43 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 5 on 1ft, belt 4 on 1ft.

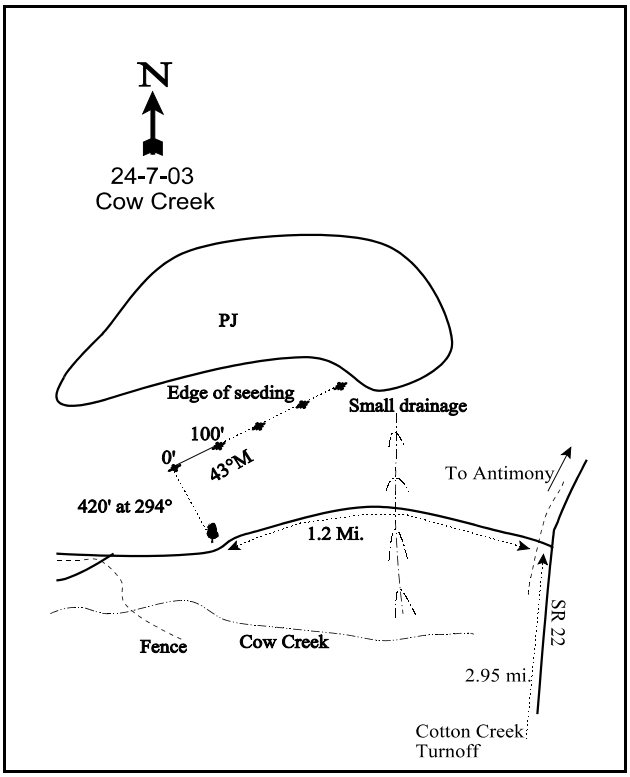
LOCATION DESCRIPTION

From the Cottonwood Creek turnoff of SR22 south of Antimony, proceed north on the highway 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone mature juniper right by the road. If you go too far (0.2 more miles) you will come to a fork by a fence. Stop by the lone Juniper and walk up the hill about 140 yards bearing 294 degrees to the start of the baseline and a short fencepost with browse tag #9002. The transect runs east-northeast along the top edge of the seeding.



Map Name: Cow Creek

Township 32S , Range 2W , Section 33



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4203924 N, 411416 E

DISCUSSION

Cow Creek - Trend Study 24-7

This trend study is located on state trust land at the mouth of Cow Creek at an elevation of 7,500 feet. This is a sagebrush-grass site that was disked and drill seeded prior to study establishment in 1987. It is a key area for elk in the spring and also for deer during the winter and spring. Wyoming big sagebrush occurs on the foothill slopes and basin big sagebrush is found on the deeper soils in the drainage bottoms. The treatment was more effective on Wyoming big sagebrush than the basin big sagebrush. The basin big sagebrush that was not killed has regrown with vigorous vegetative growth and seed stalk production. The site is located on a 12-18% slope that has a southeast exposure. Antelope probably use this area year-round. Pellet group data from 1997 estimated 7 deer, 63 elk and 27 cow days use/acre (17 ddu/ha, 156 edu/ha, and 67 cdu/ha). Sheep sign was also noted in 1997. Pellet group data from 2003 estimated 24 deer and 35 elk days use/acre (60 ddu/ha and 86 edu/ha). About half of the elk pellet groups sampled were from summer use and the deer pellet groups appeared to be from fall and winter use. A couple of cattle pats were also encountered.

The soil at the study site is moderately deep and rocky with an estimated effective rooting depth of almost 18 inches. Texture is a sandy loam which is slightly alkaline (pH 7.4). Erosion pavement is present on the surface, as are rocks of various sizes. Litter from the disked sagebrush and the drill rows of seeded grasses serve to slow overland water movement. However, the higher incidence of pedestalled bunch grasses and small rills indicates that a significant amount of soil movement has taken place in the area. The soil is very loose and easily transported during high intensity summer storms. Although the seeding greatly increased the grass cover, patches of bare ground are prevalent between the drill rows. Some erosion was noted in 2003 and the erosion condition class was determined to be slight.

The key shrub species on this site is Wyoming big sagebrush. Density was estimated at nearly 3,500 plants/acre in 1987, 94% of which were mature or decadent plants which were present prior to the discing treatment. Density declined slightly in 1991 but the number of decadent plants increased from 33% to 60%. In addition, 48% of those decadent sagebrush were classified as dying (>50% crown death). The population declined to 2,280 plants/acre by 1997 apparently due to a die-off of the decadent/dying shrubs sampled in 1991. Vigor improved in 1997 and percent decadence declined to 34%. By 2003, density declined 16% to 1,920 plants/acre. Over 1/3 of the population exhibited poor vigor and 59% were classified as decadent. More than half of the decadent sagebrush sampled were rated as dying. Young recruitment was marginal in 1987 and 1997 and poor during the drought years of 1991 and 2003. Utilization was moderate to heavy in 1987 and 1991 but mostly light to moderate in 1997 and 2003. Annual leader growth of mature Wyoming big sagebrush was good in 2003 averaging 2 inches.

The only other common shrub on the site consists of a widely fluctuating population of broom snakeweed. Snakeweed density has ranged from 220 to 4,133 plants/acre. Pinyon and juniper trees are found scattered throughout the site. Point-quarter data estimated 14 juniper trees/acre and 42 pinyon trees/acre in 1997. Overhead canopy cover of pinyon was estimated at 5%. Point-quarter data from 2003 estimated 44 juniper and 31 pinyon trees/acre with average basal diameters of 3.3 and 6.4 inches respectively. About 40% of the pinyon pine sampled were in the 1 to 4 foot height class while another 50% were trees over 12 feet in height. Juniper trees were younger with 67% of the trees sampled occurring in the 1 to 4 foot height class.

The herbaceous understory is dominated by grasses, the most abundant of which is seeded crested wheatgrass and a warm season native, blue grama. Another seeded species, intermediate wheatgrass, is less abundant and has declined in quadrat frequency from 34% in 1987 to 4% in 1997 and was not found in 2003. This site is probably marginal for intermediate wheatgrass since it is east of Mt. Dutton and within a rain shadow. Forbs are very limited with six species producing only 1% cover in 1997 and less than ½ of 1% in 2003. Rangeland alfalfa was seeded on the site but it has not done well. It had a quadrat frequency of only 3% in 1987 and was

not encountered during later readings. The only common forbs include Newberry milkvetch and a Cryptantha.

1991 TREND ASSESSMENT

Both vegetative basal and litter cover have declined dramatically since 1987. Bare ground, pavement, and rock cover have all increased. These respective increases and decreases indicate a downward trend for soil. Population density for the key browse species, Wyoming big sagebrush, has gone from 3,466 to 3,199 plants per acre, an 8% drop. Broom snakeweed has decreased by 36%. Even with the great decrease in broom snakeweed, the trend would still be slightly downward with the increase in the rate of decadency for Wyoming big sagebrush reaching 60%. Plants displaying poor vigor have also increased from 6% to 33%. Trend for the herbaceous understory is down slightly due to a significant decline in the sum of nested frequency of the seeded crested and intermediate wheatgrass. Nested frequency of blue grama increased but this is a less desirable and less productive grass.

TREND ASSESSMENT
soil - slightly down (2)
browse - slightly down (2)
herbaceous understory - slightly down (2)

1997 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, Wyoming big sagebrush, is slightly down. Density has declined by 29% due to a die-off of decadent plants. However, density of mature plants increased slightly. Use is more light to moderate, vigor improved, and percent decadence has declined from 60% to 34%. However, the percentage of decadent plants classified as dying has steadily increased since 1987, indicating further future losses in the population. Recruitment is improved with increased numbers of seedling and young plants, but they are still inadequate to replace those that have died. A positive trend indicator is the 92% decline in the density of broom snakeweed which now numbers only 220 plants/acre. Trend for the herbaceous understory is stable but forbs are still very limited.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to 1997 estimates. There is still some limited erosion occurring however, and the erosion condition class was determined to be slight in 2003. Trend for the key browse species, Wyoming big sagebrush continues to be slightly down. Density has declined 16% since 1997, while poor vigor has increased to 32% of the population, and percent decadence has increased to 59%. In addition, more than half (54%) of the decadent sagebrush sampled were classified as dying. No seedlings were encountered in 2003, and young plants were rare. Use remains mostly light to moderate indicating that these trends are primarily driven by drought. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has remained stable although nested frequency of crested wheatgrass did decline significantly. Nested frequency of blue grama remained stable but bottlebrush squirreltail and needle-and-thread increased slightly. Sum of nested frequency of perennial forbs declined. However, forbs are rare and provide little cover. Trend is considered stable.

TREND ASSESSMENT
soil - stable (3)
browse - down slightly (2)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 24 , Study no: 7

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'97	'03	'97	'03
G	Agropyron cristatum	$_{c}$207	$_{ab}$169	$_{bc}$193	$_{a}$154	6.09	4.76
G	Agropyron intermedium	$_{b}$65	$_{a}$5	$_{a}$9	$_{a}$-	.04	-
G	Bouteloua gracilis	$_{a}$90	$_{ab}$113	$_{b}$151	$_{b}$150	4.38	6.25
G	Bromus inermis	5	-	-	-	-	-
G	Dactylis glomerata	2	9	-	-	-	-
G	Oryzopsis hymenoides	2	9	6	3	.07	.04
G	Poa fendleriana	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$16	-	.15
G	Poa secunda	-	-	2	-	.00	-
G	Sitanion hystrix	$_{b}$119	$_{b}$137	$_{a}$51	$_{a}$66	.68	.50
G	Stipa comata	$_{a}$12	$_{a}$11	$_{bc}$20	$_{b}$33	.19	.66
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		502	453	432	422	11.48	12.39
Total for Grasses		502	453	432	422	11.48	12.39
F	Antennaria rosea	-	-	-	3	-	.00
F	Astragalus newberryi	$_{b}$22	$_{b}$22	$_{b}$27	$_{a}$-	.06	-
F	Chenopodium spp. (a)	-	-	3	-	.00	-
F	Cryptantha spp.	$_{ab}$17	$_{bc}$31	$_{b}$39	$_{a}$1	.59	.00
F	Descurainia pinnata (a)	-	-	$_{a}$-	$_{b}$23	-	.08
F	Gayophytum ramosissimum(a)	-	-	$_{b}$21	$_{a}$-	.26	-
F	Gilia spp. (a)	-	-	$_{a}$-	$_{b}$14	-	.05
F	Lappula occidentalis (a)	-	-	-	5	-	.04
F	Medicago sativa	4	-	-	-	-	-
F	Sphaeralcea coccinea	-	-	6	7	.01	.04
F	Streptanthus cordatus	-	-	2	-	.03	-
Total for Annual Forbs		0	0	24	42	0.26	0.18
Total for Perennial Forbs		43	53	74	11	0.70	0.05
Total for Forbs		43	53	98	53	0.97	0.23

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 24 , Study no: 7

Type	Species	Strip Frequency '97	Strip Frequency '03	Average Cover % '97	Average Cover % '03
B	Artemisia tridentata wyomingensis	64	56	6.56	7.15
B	Gutierrezia sarothrae	8	27	.04	.58
B	Juniperus osteosperma	1	0	-	-
B	Opuntia spp.	2	3	.03	-
B	Pinus edulis	3	4	6.07	5.25
Total for Browse		78	90	12.72	13.00

CANOPY COVER, LINE INTERCEPT --
Management unit 24 , Study no: 7

Species	Percent Cover '97	Percent Cover '03
Artemisia tridentata wyomingensis	-	6.25
Gutierrezia sarothrae	-	.41
Opuntia spp.	-	.20
Pinus edulis	4.80	9.28

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 24 , Study no: 7

Species	Average leader growth (in) '03
Artemisia tridentata wyomingensis	2.0

POINT-QUARTER TREE DATA --
Management unit 24 , Study no: 7

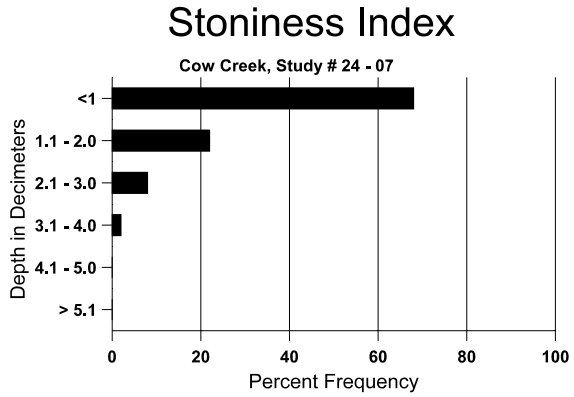
Species	Trees per Acre '98	Trees per Acre '03	Average diameter (in) '98	Average diameter (in) '03
Juniperus osteosperma	14	44	N/A	3.3
Pinus edulis	42	31	N/A	6.4

BASIC COVER --
Management unit 24 , Study no: 7

Cover Type	Average Cover %			
	'87	'91	'97	'03
Vegetation	10.00	7.25	26.76	24.88
Rock	4.25	6.25	3.86	5.69
Pavement	20.25	35.25	27.72	36.37
Litter	57.00	39.75	33.72	36.44
Cryptogams	0	0	0	0
Bare Ground	8.50	11.50	9.88	11.88

SOIL ANALYSIS DATA --
Management unit 24, Study no: 7, Study Name: Cow Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.8	74.0 (11.2)	7.4	65.0	20.1	14.9	2.7	19.1	54.4	0.5



PELLET GROUP DATA --
Management unit 24 , Study no: 7

Type	Quadrat Frequency	
	'97	'03
Rabbit	13	39
Elk	31	32
Deer	17	6
Sheep	-	-
Cattle	4	1

Days use per acre (ha)	
'97	'03
-	-
63 (156)	35 (86)
7 (17)	24 (60)
6 (15)	-
27 (67)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 24 , Study no: 7

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata wyomingensis											
87	**3466**	133	200	2133	1133	-	15	29	33	6	16/17
91	**3199**	-	66	1200	1933	-	42	21	60	33	13/16
97	**2280**	40	180	1320	780	1100	28	3	34	19	21/27
03	**1920**	-	20	760	1140	1280	35	5	59	32	23/30
Gutierrezia sarothrae											
87	**4133**	1133	933	3200	-	-	0	0	0	0	8/6
91	**2665**	-	333	1666	666	-	8	0	25	8	5/6
97	**220**	-	20	200	-	-	0	0	0	0	8/8
03	**1800**	-	780	1020	-	-	0	0	0	0	7/8
Juniperus osteosperma											
87	**66**	-	66	-	-	-	0	0	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	0	-/-
97	**20**	-	20	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	-/-
Opuntia spp.											
87	**665**	-	466	66	133	-	0	0	20	0	4/7
91	**399**	-	133	266	-	-	17	0	0	0	3/5
97	**40**	-	-	40	-	20	0	0	0	0	5/10
03	**80**	-	-	80	-	-	0	0	0	0	4/15
Pediocactus simpsonii											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	3/12
Pinus edulis											
87	**66**	-	66	-	-	-	0	0	-	0	-/-
91	**66**	-	66	-	-	-	0	0	-	0	-/-
97	**60**	-	20	40	-	-	0	0	-	0	-/-
03	**80**	20	60	20	-	-	0	0	-	0	-/-
Sclerocactus											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	3/11
03	**0**	-	-	-	-	-	0	0	-	0	-/-